

clouds on each side move from the southwest while those on the west side move from the northeast in the lower strata but from the northwest in the upper strata. Numerous references to these points in the structure of the troughs of low pressure will be found in some of the MONTHLY WEATHER REVIEWS that have been prepared by the present Editor; one of the most remarkable cases was that of February 22, 1874, described in the REVIEW of that month. Interesting cases of this kind over the land and the ocean are explained in the REVIEW for January 1894, p. 6, where the general rule is explained to the effect that when these troughs of low pressure constitute conditions of unstable equilibrium they finally break up and resolve themselves into whirls which are stable conditions; the center of the whirl which first appears at the south or west end, moves rapidly along the axis of the trough, increasing in intensity and extent until it becomes a well-marked storm center. It is very rare that a trough breaks up into two whirls, but in case it does so, the southern and western whirl is the more important and soon absorbs the other. The mechanical details of the American and Atlantic troughs must be homologous with the troughs described by Döbereiner in connection with the typhoons of the China Sea, and as the former frequently develop into Atlantic hurricanes so the latter develop into the east Indian typhoons.

[To be continued.]

#### BACK NUMBERS OF THE MONTHLY WEATHER REVIEW.

When requests for back numbers of the MONTHLY WEATHER REVIEW are received from those who desire to complete their sets, and it appears that the stock on hand in Washington is exhausted, the Editor will mention such cases in the REVIEW, in order that those who are able and willing to supply the desired numbers may have an opportunity to do so. Penalty envelopes will be sent to those who desire to return their copies to the Weather Bureau, and the Editor will undertake to transmit them to their proper destination.

Prof. Conway Macmillan, Botanical Library, University of Minnesota, Minneapolis, Minn., desires to obtain a series of the publications of the Weather Bureau for that library.

Prof. P. E. Doudna, of the Colorado College at Colorado Springs, Colo., wishes to complete his set of the MONTHLY WEATHER REVIEW, and then place it in the college library. He needs the following numbers:

All of 1873 to 1877, inclusive.

1878, March and April.

1880, July to the end of the year.

All of 1881-1885, inclusive.

1886, January to October, inclusive.

1887, April.

1888, January to July, inclusive.

1889, January to June, inclusive; August.

1890, May; July to December, inclusive; Summary.

1891, January to July, inclusive.

The Annual Summary, considered as the last number of the annual volume of the MONTHLY WEATHER REVIEW, was first published with the volume for 1891. The reprint of the MONTHLY WEATHER REVIEW as a part of the Annual Report of the Chief Signal Officer of the Army ceased with the report for 1883. The annual reports of the Chief Signal Officer for 1884-1891 contain the tabular summaries, by months and years, similar to those that have since then been published in the annual reports of the Chief of the Weather Bureau.

#### METEOROLOGY IN GREAT BRITAIN.

Mr. William Allingham, of London, communicates to the Liverpool Journal of Commerce of March 24, a review of the

report of the Meteorological Council of London, for the financial year 1897-98. He states that the small sum of £15,300 sterling is all that the Council has at its disposition to spend for climatology and storm warnings, and out of this sum £1,600 is repaid to the Government as its charge for telegraphy, in addition to a small sum for postage.

Mr. Allingham mentions the large sums appropriated by Russia, £45,000, and the United States, £195,000 for similar purposes, but he forgets to compare the relative areas of the countries. According to the Statesmen's Year Book, the area of Great Britain is 121,481 square miles, and the area of the United States, including Alaska, is 3,500,141 square miles, and that of Russia and Siberia, 8,660,282 square miles. If we divide the annual appropriations for meteorology by the areas of the States, we find that Great Britain spends 60 cents per square mile, while the United States spends 28 cents, and Russia spends only 26 cents. The expense of climatology increases, but that of storm warnings diminishes, as the area increases.

Special attention is given to ocean meteorology by the British and Russian officers, but in the United States this is done by a separate organization, viz, the Hydrographic Office of the Navy. With regard to weather forecasts Mr. Allingham says that the degree of success is greater than might be expected in consideration of the proverbial fickleness of British weather; 55 per cent of forecasts were completely verified, and 25 per cent partially so. Ninety per cent of the daily forecasts of rainy or fair weather during the hay-harvest were verified; 150 stations receive, by telegraph, warnings of approaching storms and display signals; out of 596 warnings 60 per cent were justified by gales. Mr. Allingham says:

It is stated in the report that as telegraphic information can not be received from the Atlantic, the means of forecasting certain kinds of atmospheric disturbances are necessarily wanting. Surely this is scarcely the correct way of viewing these failures. Forecasting of weather is not, or at any rate ought not to be, on all fours with the signalling of trains from station to station on a railway. Something more than this is demanded from a professional weather forecaster. The general public will have weather forecasts and every nation worth mentioning has now a state-supported weather bureau. Some idea of the importance attached to this part of the work may be obtained by the fact that at least two of the daily papers in London have special weather forecasters of their own, who compete with the state-paid officials, and one of these papers actually receives weather telegrams from several stations in England, Ireland, and Scotland, which are forwarded sometimes six hours later than those sent from the same places to the central office of the state-supported weather bureau. Consequently, under the present system of weather forecasting, this paper ought occasionally to score when the forecast of authority is a failure.

#### BREAKING UP OF THE ICE AT PIERRE, S. DAK.

We quote the following table from the March report of the Iowa Weather and Crop Service. It is said to be reprinted from the Sioux City Journal, which copied it from a manuscript notebook kept by Pierre Chouteau the famous trader after whom Pierre received its name. The table purports to give the dates on which the ice in the Missouri broke up at Pierre; no further details are given as to whether in some cases, as often happens, the ice breaks and again closes up, but it is fair to assume that these are the dates of the final break up in each year:

Year.	Month.	Year.	Month.	Year.	Month.	Year.	Month.
1846.....	April 20	1857.....	March 26	1868.....	March 25	1879.....	March 31
1847.....	April 10	1858.....	April 12	1869.....	March 29	1880.....	April 7
1848.....	April 9	1859.....	April 18	1870.....	April 8	1881.....	March 27
1849.....	April 1	1860.....	March 24	1871.....	April 2	1882.....	April 4
1850.....	April 3	1861.....	April 5	1872.....	March 14	1883.....	March 24
1851.....	March 24	1862.....	March 27	1873.....	March 11	1884.....	March 28
1852.....	March 22	1863.....	March 23	1874.....	April 14	1885.....	April 3
1853.....	March 29	1864.....	April 15	1875.....	March 25	1886.....	March 16
1854.....	April 5	1865.....	April 13	1876.....	March 30	1887.....	March 12
1855.....	March 30	1866.....	April 7	1877.....	March 16	1888.....	April 1
1856.....	April 6	1867.....	April 4	1878.....	March 28	1889.....	March 18